Form C-104
Rev. 2/01

CONSTRUCTION VALUE ENGINEERING CONCEPT PROPOSAL
MISSOURI DEPARTMENT OF TRANSPORTATION

#1

Date 06/08/2009

Contract ID 070928-X01 **Job No.** J0P0928

County Madison **Route** 67 **Original Bid Cost** $37,597,624.33

Contractor Emery Sapp & Sons **By** Matthew Oesch

Designed By Matthew Oesch **Phone** (573) 489-9216

VECP 09-44

1. **Description of existing requirements and proposed change(s). Advantages/Disadvantages**

   Emery Sapp & Sons propose to replace variable depth asphalt paving from 1074+00-1082+00 with 9" main line paving. Concrete pavement was not a feasible option under the original design. By ESS providing an innovative alternative to crossover layout and traffic control sequencing in Value Engineering Proposal #1, construction capabilities for the problem area 1074+00-1082+00 now been expanded. The proposed design will produce increased cost saving, safer travel for motorist, and provide a design that legitimately

2. **Estimate of reduction in construction costs.** $45,200.32

3. **Prediction of any effects the proposed change(s) will have on other department costs, such as maintenance and operations.**

   By paving the concrete section all in one piece, fewer joints will exist.
   This will reduce maintenance repairs at butt joints.

4. **Anticipated date for submittal of detailed change(s) of items required by Section 104.6 of the Specifications.**

   06/08/2009
   (date)

5. **Deadline for issuing a change order to obtain maximum cost reduction, noting the effect of contract completion time or delivery schedule.**

06/26/2009	Provide ample time for demo, grading, and scheduling prior to paving
(date)	(effect)

6. **Dates of any previous or concurrent submission of the same proposal.**

   N/A
   (date and/or dates)

Additional Comments:

A letter with detailed explanations of the alignment modifications and spreadsheets detailing cost savings will be included.

***** Portion Below This Line To Be Filled Out by MoDOT *****

Comments:

Matt Malone — Submitted By Resident Engineer — 6-18-09 — Date

Comments: 50/50 Split recommended based on estimated $45,200.32 savings

☑ **Approval Recommended**
☐ **Rejection Recommended**

Mark Shelton by R. Allen — District Engineer — 6-24-09 — Date

Comments:

☑ **Approval**
☐ **Rejection**

David D. Oliver BAW — State Operations Engineer — 6-26-09 — Date

Distribution: Resident Engineer, District Operations Engineer, State Operations Engineer
*Value Engineering Administrator - *MoDOT, P.O. Box 270, Jefferson City, MO 65102

EMERY SAPP & SONS, INC.

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Kansas City, MO 64106
O: 816.221.3500
F: 816.421.9333

2602 N. Stadium Blvd.
Columbia, MO 65202
O: 573.445.8331
F: 573.445.0266

5350 E. State Hwy. AA
Springfield, MO 65803
O: 417.833.9915
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June 26, 2009

Mr. Matt Malone, R.E.
Missouri Dept. of Transportation
105 Industrial Dr.
Park Hills, MO 63601

RE: Staging for Rte C & Rte N
Rte. 67, Madison County,
Job No. J0P0928

Mr. Malone:

This letter is written in proposition of a Value Engineering proposal to the construction requirements of Route 67 SBL from 1075+00- 1082+00. Emery Sapp & Sons proposes to remove the existing highway from 1075+00-1082+00, perform grading necessary to obtain designed elevations, place 4" of Type 5 Base, and place 9" of PCCP in place of the variable depth asphalt required by design.

Under the original design requirements existing Route 67 SBL would be temporarily closed during Stage 2 once traffic had been switched over to Bypass 2 constructed during Stage 1. The section of the NBL unable to be completed in Stage 1 would be graded and paved from its previous stopping point up to the tie-in at 1099+00 with existing US 67. The original design required in Stage 2 that the SBL to be graded and paved from its stopping point at approximately 1090+00 north to 1082+00. From 1082+00 north to 1074+00 the new SBL was to be tied in using variable depth Bituminous Base Asphalt and a 1 ¾ " final surfacing layer of BP-1. The asphalt wedging for 1074+00 -1082+00 would have to be performed under live traffic by original design.

Several problems surround the original design for Stage 2 of the new SBL. A vertical difference of over seven feet is seen between the proposed main line paving stopping point at 1082+00 and the existing ground level. Such a vertical difference was not taken into account by the designers, who did not provide sufficient asphalt quantities in the plans to adequately construct their design. The SBL alignment does not fall directly over the existing roadway, so as the overlay was constructed the paver would be constantly drifting out into Bypass 2. The bypass is very narrow and several safety concerns arise when looking at squeezing traffic over to make room for the asphalt pavers. The SBL cannot be wedged any further than 1080+00 without the paver interfering with the north end of Bypass 2 traffic. If Bypass 2 was to be left open while beginning the tie-in even more asphalt will be required due to the vertical variance at the point where the two intersect. Additional edge treatment would need to be provided so traffic could safely access to the new SBL. The NBL would need to be opened creating divided highway for the tie-in on the SBL to be completed from 1074+00 – 1080+00. A vertical difference of 0 -3.5 feet would have to be placed under live traffic from 1074+00-1080+00 on the SBL. Edge treatment would be required for this section, consuming

additional asphalt that was unaccounted for by the original design. This would be a very tedious and cumbersome process to complete, while attempting to provide consistent access to the traveling public.

Emery Sapp & Sons proposes to do away with the variable depth asphalt paving and replace it with 9" PCCP main line paving for 1075+00-1082+00. This option was not available under the original design due to the need for the existing roadway from 1075+00-1079+00 for access to Bypass 2. By ESS providing an innovative alternative to crossover layout and traffic control sequencing in Value Engineering Proposal #1, construction capabilities for the problem area have now been expanded. Under VE #1 the NBL would be completely constructed during Stage 1 paving. Then traffic could be switched over head to head on the new NBL during Stage 2 allowing for Bypass 2 and existing US 67 to be closed so that the SBL would be free of traffic while tying into the existing roadway from 1074+00-1082+00. Seeing as existing US 67 has been overlaid and shouldered up to 1075+00, ESS sees no reason to demolish the existing highway an extra 100 ft back to 1074+00. ESS now has the capability to demolish the existing roadway from 1075+00-1082+00 all at once and complete the entire section from 1075+00 through approx 1090+00 with PCCP main line paving simultaneously.

A spreadsheet has been attached detailing the cost allowed by design to complete the tie-in, the actual cost that would be incurred by constructing the tie-in to the original design requirements, and the cost associated with performing the work as proposed by ESS's Value Engineering Proposal. In the spreadsheet, we made an assumption to the original MoDOT designed plans. We thought MoDOT would ask us to fill in the old highway from Sta. 1080+00 to 1082+00 with Class A and then cap it with 4 inches of base rock and 12 inches of asphalt (as required for main line in place of 9" PCCP). Otherwise if we were to implement the overlay design for the entire area, we would be filling in 1080+00-1082+00 with 3.5 to 7 feet of asphalt.

By using the proposed change in construction procedure several advantages are obtained. The tie-in can be paved simultaneously with the Stage 2 pavement from 1075+00 to approx 1090+00 creating fewer seems in the mainline. All traffic can be moved to the new North Bound Lanes. This will prevent motorist from having to navigating an active work zone while our subcontractor is trying to wedge in asphalt on an open highway. Safety for traveling motorist and work zone employees will be drastically improved. A significant cost savings of $45,200.32 will also be provided by implementing the Value Engineering Proposal. No disadvantages appear evident when using the proposed concrete paving scenario vs. wedging the roadway in under traffic with variable depth asphalt.

In conclusion the value engineering proposal provides a solution to a problem area where the original design failed to take into account several important elements. Due to ESS's previous VE the Stage 2 paving of the SBL will be able to be completed from 1075+00-1090+00 in one section creating fewer joints. Because of ESS's VE Proposal #1 traffic can be moved away from the tie-in providing increased safety and fewer disruptions to the traveling public while construction is under way. A significant cost savings of $45,200.32 will be provided by using the proposed concrete pavement design. Most importantly a design that is legitimately constructible, safe, and cost effective will replace the existing one with numerous errors, questionable constructability, and several safety concerns.

3:1 off EOP of Asphalt Wedge for Edge Treatment

	EOP LT				EOP RT			
	Cut/Fill	Area sft	Volume cft	Tons	Cut/Fill	Area sft	Volume cft	Tons
1074+00	0	0	0	0.00	0	0	0	0.00
1075+00	0.63	0.59535	29.7675	2.24	0.93	1.29735	64.8675	4.88
1075+50	0.98	1.4406	50.89875	3.83	0.83	1.03335	58.2675	4.39
1076+00	0.95	1.35375	69.85875	5.26	0.96	1.3824	60.39375	4.55
1076+50	1	1.5	71.34375	5.37	0.92	1.2696	66.3	4.99
1077+00	0.96	1.3824	72.06	5.43	1.19	2.12415	84.84375	6.39
1077+50	0.93	1.29735	66.99375	5.04	0.88	1.1616	82.14375	6.19
1078+00	1	1.5	69.93375	5.27	0.91	1.24215	60.09375	4.52
1078+50	1.25	2.34375	96.09375	7.24	1.06	1.6854	73.18875	5.51
1079+00	1.5	3.375	142.9688	10.77	1.49	3.33015	125.3888	9.44
1079+50	1.97	5.82135	229.9088	17.31	2.65	10.53375	346.5975	26.10
1080+00	2.69	10.85415	416.8875	31.39	3.51	18.48015	725.3475	54.62
1080+50	3.58	19.2246	751.9688	56.62	4.28	27.4776	1148.944	86.51
1081+00	4.54	30.9174	1253.55	94.39	5.4	43.74	1780.44	134.06
1081+50	5.65	47.88375	1970.029	148.34	6.79	69.15615	2822.404	212.52
1082+00	6.94	72.2454	3003.229	226.13	8.11	98.65815	4195.358	315.89
			1316.715	99.14	TN		1747.433	131.58

VE 1074+00 - 1082+00 Alteration of Construction Asphalt to Concrete

Original Plan Quantity Allowed

	Type	CY	Tons	Cost	
Plan	Bit Base	540	1097.82	$58.00	$63,673.56
Plan	BP-1	112.5	229.28	$65.00	$14,902.88
Plan	Type 5 Base (SY)		777.78	$3.40	$2,644.44
Plan	Total Cost A3 Shld=				$13,688.89
Plan	Total Cost Daylight Base =				$3,850.00
				Plan Total =	$98,759.77

Quantity Required to Contsruct by Design Provided

Main Line Asphalt 1080+00-1082+00

Bit Base for Main Line and Edge Treatment	350.92	tons = $58.00/ton->	$20,353.47
BP-1 for Main Line and Edge Treatmetn	57.48	tons = $65.00/ton ->	$3,735.97
		Total to Complete Main Line as Designed =	$24,089.44

Type 5 Base Under Main Line ONLY 1080+00-1082+00

Unit Cost Type 5 Base =	$3.40	SY
Area of Base 1080+00-1082+00 =>	800.0	SY
Total Cost of Base Rock =		$2,720.00

Asphalt Wedging under Main Line ONLY 1074+00-1080+00

Total CY =	671.51				
BP-1=	112.35	CY =>	229.0	tons = $65.00/ton ->	$14,882.43
Bit Base=	559.16	CY =>	1136.8	tons = $58.00/ton->	$65,932.85
				Total to Complete Main Line as Designed =	$80,815.28

Daylight Asphalt on EOP 1074+00-1080+00 @ 3:1

Left Shoulder at 3:1=	99.14	tons = $58.00/ton->	$5,750.34
Right Shoulder at 3:1=	131.58	tons = $58.00/ton->	$7,631.36

	Total for Daylight of EOP =	**$13,381.70**

A3 Shoulder 1075+00-1082+00

Inside Shld	233.3 SY at $17.60 SY =	$4,106.67
Outside Shld	544.4 SY at $17.60 SY =	$9,582.22
	Total Cost A3 Shld=	**$13,688.89**

Daylight Base 1075+00 -1082+00

Inside & Outside Shld =	7 STA at $550.00/ STA =	$3,850.00
	Total Cost Daylight Base =	**$3,850.00**

Total Cost to Complete Work as Designed =	**$138,545.31**

VE Proposed Construction Alteration of Design

Concrete Main Line Pavement 1075+00-1080+00

9" Concrete Pavement =	$25.60 SY	
1075+00-1082+00=>700 x 26 /9=	2022.22 SY	
	Total Cost of Concrete =	**$51,768.89**

Type 5 Base Under Main Line ONLY 1080+00-1082+00

Unit Cost Type 5 Base =	$3.40 SY	
Area of Base 1075+00-1082+00 =>	2800.0 SY	
	Total Cost of Base Rock =	**$9,520.00**

A3 Shoulder 1075+00-1082+00

Inside Shld	233.3 SY at $17.60 SY =	$4,106.67
Outside Shld	544.4 SY at $17.60 SY =	$9,582.22
	Total Cost A3 Shld=	**$13,688.89**

Daylight Base 1075+00 -1082+00

Inside & Outside Shld =	7 STA at $550.00/ STA =	$3,850.00

Total Cost Daylight Base =	$3,850.00

Concrete Pavement Removal 1075+00-1082+00

1711.1 -> $3.05/SY to Remove =	$5,218.89

Cost to Complete by VE Proposal	**$84,046.67**

Cost Savings Provided by Using VE vs. Construction Requirments of Original Design =	**$54,498.64**

10000	560091.2	863120.6	631.31	1082+00 EOP RT
10001	560116.7	863163.5	631.31	1081+50 EOP RT
10002	560142.4	863206.1	631.542	1081+00 EOP RT
10003	560168.2	863248.8	631.644	1080+50 EOP RT
10004	560194.2	863291.4	631.554	1080+00 EOP RT
10005	560220.1	863333.8	631.715	1079+50 EOP RT
10006	560246.4	863376.2	632.326	1079+00 EOP RT
10007	560272.6	863418.5	632.357	1078+50 EOP RT
10008	560299	863460.9	632.265	1078+00 EOP RT
10009	560325.5	863503	632.218	1077+50 EOP RT
10010	560352.2	863545.2	631.878	1077+00 EOP RT
10011	560379	863587.1	632.119	1076+50 EOP RT
10012	560405.9	863629.1	632.054	1076+00 EOP RT
10013	560432.9	863671.3	632.164	1075+50 EOP RT
10014	560459.9	863713.3	632.042	1075+00 EOP RT
10015	560449	863720.4	632.372	1075+00 CL
10016	560422	863678.3	632.417	1075+50 CL
10017	560394.9	863636.2	632.384	1076+00 CL
10018	560368.2	863594.2	632.389	1076+50 CL
10019	560341.2	863552.1	632.381	1077+00 CL
10020	560314.5	863510.1	632.442	1077+50 CL
10021	560288	863467.7	632.413	1078+00 CL
10022	560261.5	863425.4	632.468	1078+50 CL
10023	560235.3	863383	632.451	1079+00 CL
10024	560209.1	863340.5	632.463	1079+50 CL
10025	560183	863298.1	632.432	1090+00 CL
10026	560157.2	863255.5	632.445	1080+50 CL
10027	560131.3	863212.8	632.389	1081+00 CL
10028	560105.6	863170	632.412	1081+50 CL
10029	560080	863127.2	632.373	1082+00 CL
10030	560068.9	863133.8	632.485	1082+00 EOP LT
10031	560094.5	863176.8	632.451	1081+50 EOP LT
10032	560120.2	863219.5	632.398	1081+00 EOP LT
10033	560146	863262.2	632.345	1080+50 EOP LT
10034	560172	863304.9	632.378	1080+00 EOP LT
10035	560197.9	863347.4	632.388	1079+50 EOP LT
10036	560224.2	863389.9	632.318	1079+00 EOP LT
10037	560250.5	863432.4	632.174	1078+50 EOP LT
10038	560277	863474.6	632.175	1078+00 EOP LT
10039	560303.6	863516.9	632.162	1077+50 EOP LT
10040	560330.2	863559.2	632.106	1077+00 EOP LT
10041	560357.1	863601.1	632.042	1076+50 EP ET
10042	560384.1	863643.2	632.066	1076+00 EOP LT
10043	560411	863685.3	632.016	1075+50 EOP LT
10044	560438	863727.4	632.337	1075+00 EOP LT
10045	560412.8	864004.6	633.938	CP352 CHECK OUT

Stakeout Tolerance Report

Job name:	VE TIE IN 1082
Trimble Survey Controller version:	12.21
Creation date:	2009-05-29
Distance/Coord units:	USSurveyFeet
Angle units:	DMSDegrees
Stakeout horizontal tolerance:	0.020
Stakeout vertical tolerance:	0.050
Tolerance checking/highlighting:	Both

Highlighted values exceed stakeout tolerances.

Name	dNorth	dEast	dElev	Code
10000	-0.025	-0.068	8.113	1082+00 EOP RT
10001	0.048	-0.085	6.791	1081+50 EOP RT
10002	0.007	-0.055	5.395	1081+00 EOP RT
10003	-0.041	-0.021	4.281	1080+50 EOP RT
10004	-0.069	-0.053	3.513	1080+00 EOP RT
10005	0.071	0.048	2.647	1079+50 EOP RT
10006	-0.056	0.048	1.489	1079+00 EOP RT
10007	0.023	0.042	1.063	1078+50 EOP RT
10008	-0.009	-0.025	0.914	1078+00 EOP RT
10009	0.063	0.036	0.875	1077+50 EOP RT
10010	-0.021	-0.025	1.190	1077+00 EOP RT
10011	-0.022	0.038	0.924	1076+50 EOP RT
10012	-0.005	0.018	0.964	1076+00 EOP RT
10013	-0.004	-0.041	0.830	1075+50 EOP RT
10014	0.020	-0.035	0.927	1075+00 EOP RT
10015	-0.012	-0.020	0.857	1075+00 CL
10016	-0.015	-0.049	0.836	1075+50 CL
10017	0.084	-0.016	0.895	1076+00 CL
10018	-0.165	-0.049	0.914	1076+50 CL
10019	0.032	0.002	0.947	1077+00 CL
10020	0.018	-0.083	0.910	1077+50 CL
10021	-0.037	0.054	1.027	1078+00 CL
10022	0.074	0.009	1.212	1078+50 CL
10023	-0.051	0.018	1.624	1079+00 CL
10024	-0.027	0.066	2.159	1079+50 CL

10025	0.008	-0.044	2.896	1090+00 CL
10026	-0.072	0.026	3.740	1080+50 CL
10027	-0.012	-0.011	4.807	1081+00 CL
10028	-0.014	0.086	5.949	1081+50 CL
10029	0.009	-0.010	7.311	1082+00 CL
10030	-0.035	0.042	6.938	1082+00 EOP LT
10031	-0.092	-0.047	5.650	1081+50 EOP LT
10032	-0.065	-0.011	4.539	1081+00 EOP LT
10033	-0.069	0.015	3.579	1080+50 EOP LT
10034	-0.028	-0.036	2.690	1080+00 EOP LT
10035	0.144	0.017	1.974	1079+50 EOP LT
10036	-0.023	0.031	1.497	1079+00 EOP LT
10037	0.016	-0.067	1.246	1078+50 EOP LT
10038	0.012	0.038	1.005	1078+00 EOP LT
10039	-0.012	-0.031	0.930	1077+50 EOP LT
10040	0.025	-0.082	0.962	1077+00 EOP LT
10041	0.006	0.072	1.001	1076+50 EP ET
10042	-0.055	-0.020	0.952	1076+00 EOP LT
10043	-0.004	-0.003	0.978	1075+50 EOP LT
10044	0.079	-0.033	0.633	1075+00 EOP LT
10045	0.041	0.020	-0.022	CP352 CHECK OUT

VALUE ENGINEERING CHECK SHEET

TYPE OF WORK

(Check one that applies)

- ❑ Bridge/Structure/Footings
- ❑ Drainage Structures (RCP, RCB, CMP's, ect.)
- ❑ TCP/MOT
- X Paving (PCCP, ect.)
- ❑ Grading/MSE Walls
- ❑ Signal/Lighting/ITS
- ❑ Misc. _____

SUMMARY OF PROPOSAL

(If needed, condense summary to a couple of lines)

Contractor proposes to replace variable depth asphalt pavement with 9" concrete pavement. This will be a 50/50 split.

SCANNING OF DOCUMENT

If the proposal is large, please mark or make note, which pages need to be scanned into the database. If there are special instructions, make note of them here.

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